What is claimed is:

1. A communication apparatus comprising:

means for obtaining channel taps associated with a communication channel;

means for determining a channel taps covariance matrix for said communication channel using said channel taps; and

means for updating said channel taps using said channel taps covariance matrix.

2. The communication apparatus of claim 1, wherein:

said means for determining a channel taps covariance matrix includes means for estimating said channel taps covariance matrix based upon the following equation:

$$\underline{\underline{\hat{C}}} = \frac{1}{N}\sum_{i=1}^{N} \underline{h}_i \underline{h}_i^{H}$$

where N is the number of training sequences used for estimating the channel taps covariance matrix and $\underline{h}_i$ is a vector of channel taps at training sequence i.

3. The communication apparatus of claim 1, wherein:

said means for updating said channel taps includes means for multiplying said channel taps covariance matrix by a constant related to a changing rate of said channel to achieve a taps changing covariance matrix.

4. The communication apparatus of claim 3, wherein:

said means for updating said channel taps includes means for determining a square root of said taps changing covariance matrix.

5. The communication apparatus of claim 1, wherein:

said means for updating said channel taps includes means for implementing the following equation:

$$\underline{h}_k = \underline{h}_{k-1} + \mu e_k \underline{\underline{C}}^{1/2} \underline{s}_k$$

where $\underline{h}_k$ represents the channel taps at the time of a symbol k, $\underline{h}_{k-1}$ represents the channel taps at the time of a previous symbol k-1, μ is a step factor, e_k is an error between an expected signal and an actual received signal, $\underline{s}_k$ is a complex conjugate of a number of previous symbol decisions at the time of symbol k, and $\underline{\underline{C}}^{1/2}$ is the square root of the covariance matrix $\underline{\underline{C}}$.

6. A communication apparatus comprising:

an equalizer to process signals received from a communication channel to reduce channel effects within said signals, said equalizer including at least one input to receive channel taps for use in configuring said equalizer; and

a channel tracking unit to update said channel taps based upon an output of said equalizer and a covariance matrix associated with said channel taps.

7. The communication apparatus of claim 6, wherein:

said channel tracking unit includes a covariance matrix estimator for estimating said covariance matrix associated with said channel taps.

8. The communication apparatus of claim 7, wherein:

said channel tracking unit includes a multiplication unit for multiplying said estimated covariance matrix by a constant related to a changing rate of said communication channel to generate a taps changing covariance matrix.

9. The communication apparatus of claim 8, wherein:

said channel tracking unit includes a square root unit to determine a square root of said taps changing covariance matrix.

10. The communication apparatus of claim 6, wherein:

said channel tracking unit updates said channel taps using the following equation:

$$\underline{h}_k = \underline{h}_{k-1} + \mu e_k \underline{\underline{C}}^{1/2} \underline{s}_k$$

where $\underline{h}_k$ represents the channel taps at the time of a symbol k, $\underline{h}_{k-1}$ represents the channel taps at the time of a previous symbol k-1, μ is a step factor, e_k is an error between an expected signal and an actual received signal, $\underline{s}_k$ is a complex conjugate of a number of previous symbol decisions at the time of symbol k, and $\underline{\underline{C}}^{1/2}$ is the square root of the covariance matrix $\underline{\underline{C}}$.

11. The communication apparatus of claim 6, wherein:

said channel tracking unit includes means for tracking a projection of the channel on eigenvectors associated with said covariance matrix.

12. The communication apparatus of claim 11, wherein:

said means for tracking only tracks the projection of the channel on eigenvectors having associated eigenvalues that exceed a predetermined value.

13. A method for performing channel tracking in a communication system comprising:

obtaining channel taps associated with a communication channel;

estimating a channel taps covariance matrix for said communication channel using said channel taps; and

updating said channel taps based on said channel taps covariance matrix.

14. The method of claim 13, wherein:

estimating a channel taps covariance matrix for said communication channel includes calculating the following summation:

$$\hat{\underline{\underline{C}}} = \frac{1}{N} \sum_{i=1}^{N} \underline{h}_i \underline{h}_i^H$$

where N is the number of training sequences used for estimating the covariance matrix and $\underline{h}_i$ is the vector of channel taps at training sequence i.

15. The method of claim 13, wherein:

updating includes using a modified least mean square (LMS) algorithm to calculate new values for said channel taps, said modified LMS algorithm using said channel taps covariance matrix.

16. The method of claim 15, wherein:

said modified LMS algorithm is expressed as follows:

$$\underline{h}_k = \underline{h}_{k-1} + \mu e_k \underline{\underline{C}}^{1/2} \underline{s}_k$$

where $\underline{h}_k$ represents the channel taps at the time of a symbol k, $\underline{h}_{k-1}$ represents the channel taps at the time of a previous symbol k-1, μ is a step factor, e_k is an error between an expected signal and an actual received signal, $\underline{s}_k$ is a complex conjugate of a number of previous symbol decisions at the time of symbol k, and $\underline{\underline{C}}^{1/2}$ is the square root of the covariance matrix $\underline{\underline{C}}$.

17. A computer readable medium having program instructions stored thereon for implementing, when executed within a digital processing device, a method for performing channel tracking, said method comprising:

obtaining channel taps associated with a communication channel;

estimating a channel taps covariance matrix for said communication channel using said channel taps; and

updating said channel taps based on said channel taps covariance matrix.

18. The computer readable medium of claim 17, wherein:

estimating a channel taps covariance matrix for said communication channel includes calculating the following summation:

$$\underline{\underline{\hat{C}}} = \frac{1}{N}\sum_{i=1}^{N} \underline{h}_i \underline{h}_i^{H}$$

where N is the number of training sequences used for estimating the covariance matrix and $\underline{h}_i$ is the vector of channel taps at training sequence i.

19. The computer readable medium of claim 17, wherein:

updating includes using a modified least mean square (LMS) algorithm to calculate new values for said channel taps, said modified LMS algorithm using said channel taps covariance matrix.

20. A communication apparatus comprising:

an equalizer to process signals received from a communication channel, said equalizer having a transfer function that depends upon a plurality of channel taps;

a channel estimator to determine initial channel taps for said communication channel; and

a channel tracking unit to track said plurality of channel taps over time, said channel tracking unit including:

a covariance matrix estimator to estimate a covariance matrix associated with said plurality of channel taps; and

an update unit to update said plurality of channel taps based on said estimated covariance matrix.

21. The communication apparatus of claim 20 wherein:

said channel estimator determines said initial channel taps using training sequences received from said wireless communication channel, said channel estimator having a priori knowledge of said training sequences.

22. The communication apparatus of claim 20 wherein:

said channel estimator determines said initial channel taps using a least squares technique.

23. The communication apparatus of claim 20 wherein:

said covariance matrix estimator estimates an initial covariance matrix based on an output of said channel estimator.

24. The communication apparatus of claim 20 wherein:

said update unit updates said plurality of channel taps based on the following equation:

$$\underline{h}_k = \underline{h}_{k-1} + \mu e_k \underline{\underline{C}}^{1/2} \underline{s}_k$$

where $\underline{h}_k$ represents the channel taps at the time of a symbol k, $\underline{h}_{k-1}$ represents the channel taps at the time of a previous symbol k-1, μ is a step factor, e_k is an error between an expected signal and an actual received signal, $\underline{s}_k$ is a complex conjugate of a number of previous symbol decisions at the time of symbol k, and $\underline{\underline{C}}^{1/2}$ is the square root of the covariance matrix $\underline{\underline{C}}$.